REMARKS

Claims 1-11 and 13-14 are pending in the application.

I. THE CLAIMED INVENTION

The application includes a single independent claim 1. An important aspect of the claimed invention is the use of relative motion between an object within a scene and a plurality of linear array detectors in order to detect objects passing through the scene and to determine direction and speed of movement of said objects. Notably, the claims are not directed to a single linear array of detectors. Instead they require a "plurality" – two or more – linear arrays of detectors.

In operation, the object to be detected passes successively through a plurality of areas of interest in the scene and hence through the field of view of each of the plurality of linear arrays. The direction of movement of the object is easily determined by looking at the order in which it passes the linear arrays. (See specification, page 2, lines 15 - 17). The speed of motion of the object is determined by the time difference between the object crossing the field of view of the linear arrays. (See specification at page 2, lines 17 - 19). Changes in size of the perceived object can be used as an indication of movement towards or away from the detectors and hence a determination of true motion can be made. (See specification at page 2, lines 24 - 25). Without limitation, the plurality of linear arrays are static.

II. TRAVERSE OF THE OBVIOUSNESS REJECTIONS

A. Traverse of the GB '388/Hardin Obviousness Rejection

The examiner rejected claims 1-4, 7-9 and 13-14 for being obvious over Burgess GB 2154388 in view Hardin et al (USP 5,642,299). It is the examiner's position that Burgess discloses all of the features of independent claim 1 except for (1) a plurality of linear arrays of detectors spaced substantially parallel to one another to image a plurality of areas of interest in a scene; and (2) a system comprising a signal processor for detecting images received by the plurality of arrays and determining direction and speed of movement detected. The examiner takes the position that Hardin et al. discloses the missing claim 1 features. The examiner justifies the combination of references on the basis that the combination would provide an image system

that not only captures and saves images of vehicles passing thorough an observed scene but that would also measure the direction and speed of the vehicle; and such a feature is extremely useful for security check points. The examiner's rejections are traversed at least because the cited prior art does not disclose all claim features. Moreover, the rejection is traversed because the examiner has not given a logical reason for combining the references.

1. The cited art does not teach the use of a plurality of linear arrays

Firstly, we would respectfully point out to the examiner that independent claim 1 is directed to a plurality of linear detector arrays and Burgess teaches only a single linear detector array - not a plurality of linear detector arrays as the examiner maintains in the Office Action. Accordingly, the cited prior art, and in particular, Burgess fails to teach the provision of a plurality of linear arrays and all claims are non-obvious and patentable because there is no prima facie case of obviousness.

Independent claim 1 is further non-obvious and patentable because Hardin does not disclose or suggest the claim features the examiner submits are absent from Burgess. In particular, the examiner's position that the claim 1feature of "determining the direction . . . of movement" should fall out from the calculation of speed in Hardin even though there is no explicit teaching in Hardin that the system detects direction of movement is technically flawed and cannot stand. The direction of movement is not determined by Hardin because Hardin only teaches that that the speed of a target is determined (a scalar quantity) and not the velocity (a vector quantity which has a direction component). The examiner appears to be importing the feature of direction detection from the presently claimed invention. Accordingly independent claim 1 and all pending independent claims are non-obvious and patentable because Hardin does not disclose direction detection and the skilled person seeking to implement an image processing system capable of determining direction and speed of movement of an object would not have been motivated to combine the teaching in Hardin with that of Burgess with any expectation of achieving said desired technical effect.

Independent claim 1 and all dependent claims are also non-obvious and patentable because Hardin does not teach "linear arrays of detectors" of independent claim 1. Rather, Hardin utilises two-dimensional detector arrays, for example conventional CCD/video cameras. By way of support, it is clear from Figures 2, 3, 12, 13 and accompanying text in the Hardin specification

that the arrays are two dimensional and not linear arrays. In the interests of clarity, Hardin Figs. 4a, 6 and 7 are plan views of the system and hence only the top row of pixels in the two-dimensional arrays are shown. Accordingly, even if one of ordinary skill in the art were to combine Burgess and Hardin, the technical effect – linear arrays - and benefits of the present invention would not be achieved.

Additionally, independent claim 1 and all pending dependent claims are non-obvious and patentable because Hardin does not disclose or suggest arrays of detectors arranged to image "a plurality of areas of interest in the scene' as required by claim 1. Instead, Hardin images only a single area of interest in the scene. Referring specifically to Figure 4a of Hardin, although the two detector arrays have different fields of view in the scene, there is an overlap region in the scene having width WR (line segment between points E and S in Fig. 4a) which is imaged on both detector arrays and is therefore common to both detector arrays. (See Hardin, column 6, lines 7 - 10 refer). This overlap region width WR is a fraction of a line which approaches unity as the range to the target approaches infinity (i.e. the fields of view tend to overlap completely as the range approaches infinity) and goes to zero at the minimum operating range. (See Hardin, column 6, lines 4 - 7 refer). It is imperative in Hardin that at least a portion of the target is located within the field of view common to both lenses / arrays (i.e. a single area of interest) for the system to operate successfully. By way of further confirmation, column 5, line 47 confirms that the system taught in Hardin obtains a "stereoscopic image of the target". To this end, the lines of sight of each of the camera lenses are arranged to be parallel (see Hardin, column 2, lines 7 and 8).

Hardin does disclose obtaining a plurality of images of the scene at different times (at times T1, T2, ... Tn, see Hardin, column 1 line 64 to column 2, line 7) in order to calculate the speed of the target, however, said images are of a single/common area of interest in the scene. Taking a plurality of images of a single field of view in a scene as taught in Hardin is not the same as imaging "a plurality of fields of view in a scene" as claimed in the present invention. To reiterate, the system taught in Hardin is only capable of measuring range and speed of a target whilst the target remains within a field of view (i.e. an area of interest) within the scene common to both detector arrays. If the detector arrays in Hardin were arranged to image different fields of view (areas of interest) in the scene at different times then the system would not function.

Furthermore, all claims are non-obvious and patentable because Hardin teaches away from speed measuring systems such as the presently claimed invention which determine direction and speed of motion of an object in a scene by acquiring images at different times and comparing the relative sizes of the images in the field of view as a function of time. By way of specific example, Hardin, column 1, lines 31 - 40 teach that attempts to design such optical speed measuring systems have suffered from one or more defects regarding accuracy or cost of implementation. Accordingly, Hardin teaches away from combining the teaching therein with that of Burgess.

Finally, even if the skilled person were to incorporate Hardin's speed detection system into Burgess's image processing system as the examiner suggests, the technical effect of the presently claimed invention would still not be achieved. To reiterate, the signal processor of the presently claimed invention determines direction of movement of an object by looking at the order in which an object passes through a plurality of areas interest in the scene and determines speed of motion by looking at the time difference between the target crossing the plurality of area of interest (i.e. the field of view of the linear arrays in the system) and / or comparing the relative sizes of the images in the field of view as a function of time. In contrast, the speed detection system in Hardin only images a single area of interest in the scene using two-dimensional detector arrays and calculates the range to a target and speed using trigonometry. Independent claim 1 and dependent claims 2 - 11, 13 and 14 are non-obvious and patentable over Burgess in view of Hardin for this reason as well.

2. Claim 14 is independently patentable

Claim 14 is separately non-obvious and patentable over the cited prior art at least because there is no teaching nor motivation in Hardin to arrange linear detector arrays such that as the object passes through the scene "a component of movement thereof is substantially orthogonal to an alignment direction of said arrays". Rather, as noted above, in Hardin the arrays are two-dimensional arrays arranged such that as the object passes through the scene, a component of movement thereof is substantially parallel with the line scan direction of said arrays, i.e. the line scan direction is parallel with the base line b. (See Hardin, Figs. 4 - 6 and the accompanying text in columns 5 and 6). In the alternative embodiment highlighted by the examiner in column 3, lines 4 – 19, the two-dimensional array is oriented so that the line scan direction is perpendicular

to the baseline. In this embodiment, however, the baseline is vertical (see Fig. 13) and hence the line scan direction is still substantially parallel with a component of movement of the object and not orthogonal as claimed in claim 14.

3. The examiner's grounds for combining references is not logical

According to MPEP §§ 2142 and 2143, it is the Examiner's burden to establish a *prima facie* case of obviousness by clearly articulating reasons with rational factual underpinnings to support the conclusion of obviousness. In this case, the examiner has not met the burden of establishing a prima facie case of obviousness because the examiner's reasoning for combining the reference makes no sense.

The examiner justifies the combination of Burgess and Hardin on the basis that it would "provide an image system that not only capture and save images of vehicles passing through an observed scene but [it would] also measure the direction and speed of the vehicle." The examiner concludes that "Such feature is extremely useful for security check stations." (See page 4 of the Official Action). The examiner's reasoning for combining the references is not rational or logical. In particular, the examiner has not shown that one skilled in the art at the time of the invention would understand that "security check stations" were in need of the claimed systems at the time of the invention. Further, neither the cited references nor the pending application is directed to systems that are used in security check stations. Therefore, the cited references and the instant application do not support the examiner's reasons for combining the references. Moreover, the examiner has not articulated why a person of ordinary skill in the art who was interested in improving systems related to security check stations would have consulted the cited prior art in the first place since, as noted above, neither reference is related to systems used in security check stations in the first place.

It appears that the examiner's basis for combining the references – to fulfill the needs of security check stations – was fabricated in hindsight with the applicant's invention in mind. Therefore, the obviousness rejection should be withdrawn because the examiner has not provided any "factual underpinnings" that justify examiner's combination of references.

B. The Obviousness Rejection Of Claims 5-6 And 10-11

The examiner rejected remaining independent claims 5-6 and 10-11 for obviousness over Burgess in view of Hardin and further in view of Vock et al. (USP 5,789,519)(claims 5-6); in

view of Zhdanov (USP 6,633,256)(Claim 10); and in view of Martin (USP 6,243,131). Claims 5-6 and 10-11 are non-obvious and patentable at least by virtue of their dependence upon independent claim 1 which is patentable for at least the reasons recited in section II(A) above.

CONCLUSION

All pending application claims are believed to be patentable for the reasons recited above. Favorable reconsideration and allowance of all pending application claims is, therefore, courteously solicited.

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